

CLAIMS

1 An optical scanning device for scanning at least a first type of information carrier (11) having a first information layer (111) and a first transparent layer (112) of a first thickness and a second type of information carrier (12, 411) having a second information layer (121, 412) and a second transparent layer (122, 413) of a second thickness greater than the first thickness, said optical scanning device comprising means (401, 402) for generating at least a first and a second radiation beam (403, 404), and an objective lens (10, 20, 408) comprising at least an annular part (101, 201) having a first numerical aperture and a central part (102, 203) having a second numerical aperture higher than the first numerical aperture, wherein the first information layer is intended to be scanned by the first radiation beam through the central part of the objective lens and the first transparent layer, and the second information layer is intended to be scanned by the second radiation beam through the annular part of the objective lens and the second transparent layer.

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895

2 An optical scanning device as claimed in Claim 1, wherein said objective lens comprises an optical axis and a cavity located around said optical axis, said cavity having a substantially cylindrical shape, the bottom of said cavity forming the central part of the objective lens.

3 An optical scanning device as claimed in Claim 1, wherein the second numerical aperture is higher than 0.7 and the first numerical aperture is more than ten per cent lower than the first numerical aperture.

4 An optical scanning device for scanning at least a first type of information carrier having a first information layer and a first transparent layer of a first thickness and a second type of information carrier having a second information layer and a second transparent layer of a second thickness greater than the first thickness, said optical scanning device comprising means for generating at least a first and a second radiation beam, and a lens assembly comprising a first lens (30) with an annular part (301) having a first numerical aperture and a central part (302), and a second lens (31), the second lens and the central part of the first lens forming a dual-element objective lens having a second numerical aperture higher than the first numerical aperture, wherein the first information layer is intended to be scanned by the first radiation beam through the dual-element objective lens and the first transparent layer, and the second information layer is intended to be scanned by the second radiation beam through the annular part of the first lens and the second transparent layer.

5 An objective lens (10, 20) comprising at least an annular part (101, 201) having a first numerical aperture and a central part (102, 203) having a second numerical aperture, wherein the second numerical aperture is higher than the first numerical aperture.

6 An objective lens as claimed in claim 5, said lens comprising an optical axis and a cavity located around said optical axis, said cavity having a substantially cylindrical shape, the bottom of said cavity forming the central part of the objective lens.

7 An objective lens as claimed in claim 5, wherein the second numerical aperture is higher than 0.7 and the first numerical aperture is more than ten per cent lower than the first numerical aperture.

10 8 An objective lens as claimed in claim 5, wherein the first numerical aperture is between 0.35 and 0.7 and the second numerical aperture is higher than 0.7.

9 An objective lens as claimed in claim 5, wherein the first numerical aperture is between 0.35 and 0.7 and the second numerical aperture is higher than 0.8.

15 10 A lens assembly comprising a first lens (30) with an annular part (301) having a first numerical aperture and a central part (302), and a second lens (31), the second lens and the central part of the first lens forming a dual-element objective lens having a second numerical aperture, wherein the second numerical aperture is higher than the first numerical aperture.